

Claims

1. A method for controlling the temperature of the gases entering an internal combustion engine (58),
5 particularly of an automotive vehicle, characterized in that the gases are circulated in a liquid/gas heat exchanger (2, 12, 22, 34, 44) prior to entering the internal combustion heat engine (58), and in that a high temperature liquid and/or a low
10 temperature liquid is circulated in the liquid/gas heat exchanger in order to heat and/or cool the gases (84) as required.
2. A liquid/gas heat exchanger for use in the method of
15 claim 1, characterized in that the heat exchanger is a single-stage heat exchanger (2, 12) and in that valve means (4) are provided to circulate either a low temperature liquid, or a high temperature liquid, or a mixture of both liquids, in the heat
20 exchanger (2, 12).
3. The liquid/gas heat exchanger as claimed in claim 2, characterized in that it comprises a section (14) through which the engine intake air (15) passes and
25 a section (16) through which a recirculated fraction of the exhaust gases (18) passes.
4. A liquid/gas heat exchanger for use in the method as
30 claimed in claim 1, characterized in that it comprises a high temperature stage (24, 36) in which a high temperature liquid can circulate, and a low temperature stage (26, 38) in which the low temperature liquid can circulate, interconnecting
35 means (76, 86, 106) for controlling the circulation of the high temperature and low temperature liquids as required.
5. The heat exchanger as claimed in claim 4, characterized in that the high temperature stage

(36) comprises a section (40) through which the engine intake air (41) passes and a section (42) through which a recirculated fraction (43) of the exhaust gases passes.

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6. The liquid/gas heat exchanger as claimed in claim 5, characterized in that the low temperature stage (38) also comprises a section (42) through which a recirculated fraction (43) of the exhaust gases passes.

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7. A device for managing the temperature of the gases entering a heat engine (58), particularly of an automotive vehicle, comprising a main loop (52) equipped with a main pump (60) for circulating a heat transfer fluid between the heat engine (58) and a main radiator (64) for cooling at high temperature, characterized in that it comprises a secondary loop (54) including a secondary low temperature radiator (78), the device further comprising a liquid/gas radiator (2, 12, 22, 34, 44) as claimed in one of claims 2 to 6, and interconnecting means (76, 86, 106) for circulating the heat transfer fluid in the liquid/gas heat exchanger as required to heat and/or cool the gases (84) entering the engine (58).

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8. The management device as claimed in claim 7, characterized in that it comprises a single-stage heat exchanger (2, 12) and a three-way valve (76) for circulating either the hot heat transfer fluid directly leaving the internal combustion engine (58) in the heat exchanger, or a cold heat transfer fluid leaving the low temperature radiator (78), or an adequate mixture of both fluids.

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9. The management device as claimed in claim 7, characterized in that it comprises a single-stage heat exchanger (2, 12) and a branch on the high

temperature fluid circuit equipped with an additional circulating pump (86), a valve (76) for circulating either the hot heat transfer fluid directly leaving the heat engine (58), or the cold
5 heat transfer fluid cooled in the low temperature radiator (78), or a mixture of both fluids.

10. The management device as claimed in claim 7, characterized in that it comprises a two-stage heat
10 exchanger (22, 34, 44), a three-way valve (76) for circulating the hot heat transfer fluid leaving the internal combustion engine (58) in the high temperature stage, and a cold heat transfer fluid cooled in the low temperature radiator (68) in the
15 low temperature stage of the heat exchanger.

11. The management device as claimed in claim 7, characterized in that it comprises a two-stage heat
exchanger (22, 34, 44), a two-way valve (106) for
20 circulating the hot heat transfer fluid directly leaving the internal combustion engine (58) in the high temperature stage of the heat exchanger (22, 34, 44), an additional loop equipped with a circulating pump (86) for circulating the cold heat
25 transfer fluid cooled in the low temperature radiator (78) in the low temperature stage of the heat exchanger (22, 34, 44).